Chief, R&D Branch

31 January 1961

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Field Training of Engineers

1. In the development of the [redacted] many minor circuit alterations suggested themselves to the design engineers as resulting in convenience or simplification for the individual who must use and depend on the device in the field. Some of these could be and were incorporated into the engineering prototype, e.g., the backspace, the built-in read-out device, the way a message is erased as a new one is typed, the way messages may be sent "on line" as typed, the form and arrangement of the function selector switches, the layout of controls on opposite sides of the keyer, the "ready" light, the general shape of the unit, splitting of the memory into three selectable bays, the way the keyboard is locked when the function switch is not in the TYPE position, the full alpha-numeric capability, and the EMERGENCY ERASE button. Other features were seriously considered and not used, although many have been tested: a folding keyboard, a built-in speaker to monitor transmission and reception, splitting of the [redacted] into four cigarette-pack units including the keyboard, manual buttons to be pressed in proper sequence to preset the many internal cores and circuits (more economical than the automatic system which was developed, but more taxing of the operator), automatic electronic switching between the three memory bays as they are filled, self-contained button-cells which recharge automatically for pocket transmission of a single message without the bulky flashlight cells which normally attach to the unit, a built-in or accessory counter for keeping track of the place in the message as it is typed, and many others.

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2. During informal discussions with visitors to the laboratory from many different departments, very few suggestions of the above type were received. This was due to the officers' unfamiliarity with the various things that can be economically accomplished with the core/solid-state techniques used in the [redacted] and in other recent projects. Many of the features that were used were coolly received: the full teletype keyboard and the single-unit housing proved to be especially controversial.

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3. The [redacted] is flexible enough to undergo extensive alterations so as to favor any of the requirements (cost, shape, size, utility, time until produced, and reliability) at the expense of certain others, before the production prototype is constructed, now that its design problems have been solved. Each redesign, however minor, introduces a flood of mistakes in layout, paperwork and planning which must then be corrected at length, in addition to the more straightforward problems of an electronic nature. Therefore, any redesign or modification should be completed before the production prototype is built. (Completion of the production prototype will take approximately three months and will signal start of production). 50X1

4. Since the design engineers entered this field themselves only two years ago, and since the selection and incorporation of such features and accessories involves painfully complex juggling of cost, developmental time, size reliability, interaction with other circuits, and overall utility, the design engineers have been given a free hand in deciding what form the [redacted] should take, how large it would be, and how much it would cost. In no case has a decision of the design engineers been overruled. Although there isn't room in this memorandum to present the reasoning behind all conclusions, the two most controversial will be discussed very simply. The full teletype keyboard was employed at little extra cost and size to permit use of the [redacted] as an early warning device in clear text at a moment's notice, on the assumption that a majority of the individuals so equipped would be partially literate in a Western language. The device was housed in a single unit to minimize the use of inherently unreliable interconnections and to add to the operator's assurance by eliminating a whole series of steps which he must perform properly in order for his mission to be successful. The only admitted drawback of the extra buttons on the keyboard is the added complexity which they present to the eye of a technically timid operator who normally uses only the buttons in the top row for numeric messages. In compensation some feel that their presence would contribute some esprit to the same individual, being arranged exactly like a typewriter keyboard. The drawback of a single-unit housing is its comparative difficulty of concealment, over cigarette-pack subunits. The engineers are prepared to demonstrate that the total volume of the [redacted] would be markedly increased by subunitization. 50X1 50X1 50X1

5. Since, if approved, the [redacted] program will represent a considerable investment by the U. S. Government and will certainly lead to greater projects, some preliminary expense and activity may be called for to ensure that the [redacted] and future technical devices will be capable of maximum utilization with maximum assurance by the actual operator in the actual situation, as well as being specialized to our needs. This could be accomplished in part by direct liaison between the engineers and case officers who use the equipment. Present liaison has been adequate for development of some very good equipments, but it exists via the higher administrative levels. There is only occasional contact between the people who actually have the needs and the people who are intimately acquainted with the possibilities; minor but important details must be lost en route with this arrangement. The direct liaison recommended would be of a detailed and informal sort (note the examples already given), and should not conflict with decisions of policy or of general class of devices to be developed. Such larger decisions should remain in the hands of offices presently endowed with the task. Rather, the result would be to unburden these offices to some degree, and to give the design engineers a more authoritative foundation for their own role. It would be hoped that these offices would continue to be receptive to suggestions from the engineers.

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6. A subjective knowledge of the operator's problems is a necessity on the part of equipment design engineers. None of the engineers at the R&D Laboratory have received [redacted] of any sort, although two of the four engineers on the [redacted] including the author, are officers in the armed forces. It is respectfully submitted that there is a clear case for such training and that the necessary time can be scheduled without undue interference with projects now in progress. Since his employment with the Agency, the author has been surprised that such training is not offered routinely.

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7. Some engineers in the design section of the R&D Laboratory would welcome agent training in awareness of its rigorous nature, and would accept any assignments for which they would thereby be qualified. Others would accept training if offered, provided they would not at a later time be required to endanger themselves, out of consideration for their family status.

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R&D/Lab/JHS:aje (31 January 1961)